RICE

Teaching Chemistry Concepts via Inquiry: CHEM 570/571

August 2014 – April 2015

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Required Text (provided):

Hutchinson, John. "Concept Development Studies in Chemistry 2013." Connexions. October 7, 2013. http://cnx.org/content/col11579/latest/.

Llewellyn, Douglas. *Teaching High School Science Through Inquiry and Argumentation, 2nd ed.* Thousand Oaks, CA: Corwin Press, 2012. Print.

Gallagher-Bolos, Joan, and Dennis Smithenry. *Whole-Class Inquiry: Creating Student-Centered Science Communities.* Arlington, VA: NSTA Press, 2009. Print.

Supplemental Reading:

Walsh, Jackie, and Beth Sattes. *Quality Questioning: Research-Based Practice to Engage Every Learner.* Thousand Oaks, CA: Corwin Press, 2005. Print.

Additional readings will be supplied electronically

Summary of Program:

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Teaching Chemistry Concepts via Inquiry is designed for in-service secondary teachers, is aligned with the TEKS and the Texas CCRS, and is based on inquiry teaching practices. The course employs laboratory activities, guided discussions, interactive demonstrations, problem solving activities, chemistry simulations, and guest lecturers in order to enhance the teacher's content knowledge and promote exploration of effectively proven "best practices" in educational pedagogy. The course is a student-centered, inquiry-oriented community of learners. *Every teacher participant is expected to engage in active discussion and analysis. This requires that every teacher participant complete and critically analyze readings and chemistry content activities, as well as evaluate their classroom practices.*

Course Objectives:

1. Enhance teacher chemistry content knowledge

2. Facilitate the transformation of teacher practice through the exploration of best practices in educational pedagogy, including inquiry instruction
3. Establish a professional learning community among teacher colleagues for support
4. Increase teacher leadership capacity in the science education professional community

Course Expectations:

The stipend amount and grade received for the course are based on the completion of all components of the Teaching Chemistry Concepts via Inquiry program:

1. Attendance and participation
2. Pre- and post-tests/surveys
3. Student tests/data
4. Course assignments
5. End of course presentation

Safety Regulations:

You must wear the following Personal Protective Equipment (PPE) at all times while in the lab (no exceptions)

- Long-sleeved, knee-length lab coat
- Safety glasses/goggles
- Clothing that fully covers yourself to the ankle (pants are best)
- Closed-toe shoes with backs (full coverage shoes are best, high heels are discouraged)

Based on the experiment or procedure, additional PPE such as gloves may be required. Laboratory gloves should only be worn inside the laboratory. Furthermore, the instructor or lab assistant must always be physically present for you to work in the lab. ***You will not be allowed to work in the lab if you fail to meet these safety regulations.***

Attendance:

You are expected to attend all class sessions. Receipt of the full summer stipend is contingent on completing all 40 hours of the summer program. If you complete less than 40 hours in the summer, your stipend will be held until such time that

you have accumulated 40 hours by attending trainings in the fall. Receipt of the fall/spring stipend is contingent on completing at least 60 out of the 75 hours scheduled during the fall and spring semesters. Attendance of less than 60 hours will result in no stipend being awarded. ***Consequently, RESST participants may miss no more than a combined 15 hours in the summer, fall, and spring to receive a full stipend.*** If class schedule conflicts arise, please contact Amber. A limited number of make-up hours may be available with instructor pre-approval. ***Please sign in and out on the attendance sheet at each class session.***

Testing:
Participants are required to complete several pre-tests and post-tests during the course of the program as well as course evaluation surveys. ***Participants must complete these tests/surveys in order to receive their stipend.***

Assignments:
Assignments are designed to reflect on or apply the knowledge gained in class and/or to prepare for future class discussions. While completing readings, notes or annotations are a must so that you will have material to facilitate discussion every week. ***If a component of the program is not completed (such as not attending required sessions or not fully participating), the participant will not receive the stipend.*** Any participant with special needs or concerns is requested to speak with Amber as soon as possible. All discussions will remain confidential.

End of Course Presentation:
At the end of the program, each participant will be required to make a "poster presentation" detailing the implementation of at least one student-centered, inquiry-oriented lesson in their classroom. Presentations should include examples of student work, lesson documents, descriptions of modifications made, and teacher reflection. Inclusion of pictures or video of the lesson is strongly encouraged. The RESST staff will provide guidance throughout the year to assist participants in preparing their presentations.

Chemistry Summer Institute
August 4 – August 8, 2014
8:00 a.m. – 4:30 p.m.

DATE	TEKS		LESSONS AND ACTIVITIES	HOMEWORK
Mon., 8/4/14	§112.35 2E, F, G, I 4A, B	Content	Welcome/Documentation/Intro to OWL-Space/Pre-Testing Matter and Change via Inquiry – Lesson 1: *Describing intensive and extensive properties of matter, designing an experiment to determine the density of metals and to classify density as an intensive or extensive property*	**Read** *Teaching High School Science Through Inquiry and Argumentation (THSSTIA)* Ch. 1
		Pedagogy & Leadership	10 Beliefs About Inquiry	
Tues., 8/5/14	§112.35 1B, 2E,	nt	Significant Figures POGIL Matter and Change via Inquiry – Lessons 2 – 3: *Classifying properties of*	**Read** *Concept Development Studies (CDS)* Ch.

	4A – D	Content	*mixtures, designing an experiment to separate a mixture, percent composition, determining evidence of chemical change, distinguishing between physical and chemical changes*	2, *THSSTIA* Ch. 2 Answer *CDS* Ch. 2 Review and Discussion Questions
		Pedagogy & Leadership	**Dr. John Hutchinson** - Introduction to teaching via inquiry methods and the CDS Process Oriented Guided Inquiry Learning (POGIL) Quality Questioning Part I	
Wed., 8/6/14	§112.35 6A, 9A 5A – B	Content	Matter and Change via Inquiry – Lessons 4: *Describing phases of matter and phase changes, distinguishing between physical and chemical changes* **Dr. John Hutchinson** – Atomic Molecular Theory *Using the Laws of Definite and Multiple Proportions to support an atomic model of matter, using Avogadro's Law to establish relative masses of atoms*	**Read** *CDS* Ch. 4 **Answer** *CDS* Ch. 4 Review and Discussion Questions
		Pedagogy & Leadership	Designing Matter and Change "Evaluate" Tasks *THSSTIA* Ch. 2 Discussion Quality Questioning Part II Data First Chemistry	
Thurs., 8/7/14	various	FIELD TRIP	***Field Experience: ExxonMobil Tour***	**Read** *THSSTIA* Ch. 3 & 4
Fri., 8/8/14	§112.35 6A 5A – B	Content	Organizing the Elements – *Analyzing patterns in elemental properties to produce a working periodic table with predictive power* **Dr. John Hutchinson** – Structure of the Atom *Modeling Rutherford's gold foil experiment to determine the structure and scale of the atom* Rutherford Goes on a Road Trip – *Putting the scale of the atom into perspective*	**Read** *CDS* Ch. 5, *THSSTIA* Ch. 5 **Answer** *CDS* Ch. 5 Review and Discussion Questions
		Pedagogy & Leadership	Matter and Change Lesson Planning RET Poster Presentations Goal-Setting	

SUMMER TOTAL HOURS: **40**

CHEM 570 – Fall Schedule
Thursdays, September 4 – December 11
6:00 p.m. – 9:00 p.m.

CLASS: 9/4, 9/11, 9/18, 9/25, 10/9, 10/16, 10/23, 10/30, 11/6, 11/13, 12/4, 12/11
NO CLASS: 10/2 (Enjoy your 3 day weekend!), 11/20 (Visit us at CAST!), 11/27 (Happy Thanksgiving!)

A complete schedule of activities for each class will be provided on the first day of fall class, September 4th.

FALL TOTAL HOURS: **36**

CHEM 571 – Spring Schedule
Thursdays, January 8 – April 16
6:00 p.m. – 9:00 p.m.

CLASS: 1/8, 1/15, 1/22, 1/29, 2/5, 2/12, 2/19, 2/26, 3/5, 3/12, 3/26, 4/9, 4/16
NO CLASS: 3/19 (Happy Spring Break!), 4/2 (Enjoy your 3 day weekend!)

A complete schedule of activities for each class will be provided on the first day of spring classes, January 8th.

SPRING TOTAL HOURS: **39**
PROGRAM TOTAL: **115**